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"From Stump Thru Mill"

CANUSA-East and the University of Maine, Orono, joined hands to sponsor¹ a 3-day symposium on recent advances in spruce-fir utilization technology. Held August 17-19 on the UMO campus, the meeting attracted an audience of 200 from both sides of the border. F. L. C. (Les) Reed, Assistant Deputy Minister of the Canadian Forestry Service; and John B. Crowell, Jr., Assistant Secretary of Agriculture, gave the keynote addresses. Gregory N. Brown, newly appointed dean of UMO's College of Forest Resources, served as host. Wrapping up the conference was Joint Policy and Program Council member Fred Knight.



Figure 1. From the left, Gregory N. Brown, Les Reed, and John Crowell chat in front of UMO's Nutting Hall. (Photo: courtesy of PICS, University of Maine).

In between, 24 speakers from industrial and university venues gave talks on four major topics: harvest/transportation/storage of spruce-fir timber, wood as an energy source, using budworm-killed timber in pulp and paper, and spruce-fir for wood products.



Figure 2. Seven Islands' Mike St. Cyr describes new opportunities in wood transportation.

Here are some fast facts that came out during the sessions:

- The 1970's outbreak of spruce budworm destroyed 106 million ft³ (3 million m³) of wood in the Eastern United States and Canada.
- Studies of pulp made from budworm-killed timber revealed no significant losses in physical properties or shive levels, though pulp brightness does decrease.
- More than 90 percent of new single-family homes are wood framed.
- Chemical analysis of wood reveals that all species have about the same makeup: 50 percent carbon, 7 percent hydrogen, 40 percent oxygen, and less than 1 percent nitrogen and ash. The oxygen in wood can burn by itself in a no-oxygen atmosphere!
- Wood (whole-tree chips) makes a superb boiler fuel: it costs about the same as coal, i.e., about half as much as oil, burns clean, and is renewable. One million BTU's (1.05 million kJ) of heat from wood costs around \$3.13.
- W. D. Sewall Company's new wood-fired boiler produces 190,000 lb (86 184 kg) of steam per hour, supplies all the company's electrical needs, and generates excess electricity that Sewall sells to its local power company. This flexible steam system can simultaneously burn both coal and wood on the grate, and no. 2 and 6 fuel oil if necessary. Daily chip consumption runs about 1,800 tons (1633 tonnes), and the company's chip storage building is the size of a football field. It holds just a week's worth of fuel.
- Extensive tests of thermomechanical pulping (TMP) properties of budworm-killed balsam fir demonstrated that such wood is suitable for TMP when harvested within 5 years of death.
- Most pulping qualities are unaffected by wood degradation due to budworm activity, but brightness and tear factor — the two factors most critical to manufacturers of fine writing papers — are significantly reduced.
- New-home construction and remodeling consume about half of lumber and wood-based panel products in the United States. It is especially good news, therefore, that American housing starts could exceed 1.6 million this year and reach 2 million by 1985.
- Strength-property standards for balsam fir in the United States were derived from a sample of three (!) trees growing (?) in a dry creek bed in

¹ Additional sponsors included the Maine Department of Conservation, Region VI of the Society of American Foresters, and the northeast section of the Forest Products Research Society.

Wisconsin in 1935. Recognizing that these trees may have been less than "standard" for their species, the Forest Service's Forest Products Lab in Madison, Wisc., has begun a program to evaluate the strength of visually graded structural lumber of all commonly used species. New standards will be implemented in 1985, and results of this study could stimulate demand for spruce-fir in construction.

- Flakeboard and waferboard made from healthy and 1-year-dead balsam fir are equal to or better than the same products made from aspen, the usual furnish.
- High-quality trees produce high-quality products. To improve the percentage of our forests occupied

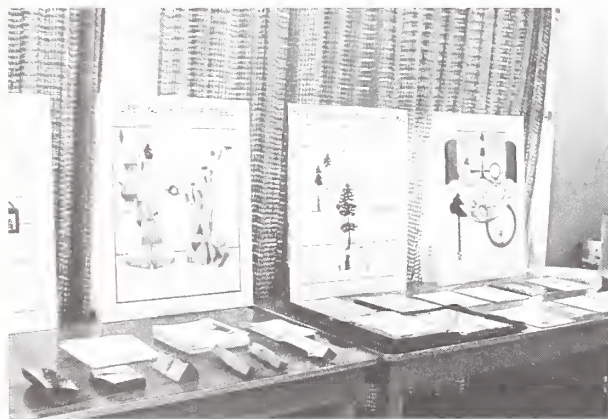


Figure 3. Part of Alex Shigo's series of color posters and wood samples, another technology transfer display from the Northeastern Forest Experiment Station.

by such trees, a three-point plan should be implemented: reduce logging damage, plant trees with superior growth rates *and* resistance to the spread of decay, and eliminate flush-cut pruning.

The conference was beautifully organized and came off without a major hitch. Planners had arranged for low-cost food and lodging right on campus. Friday afternoon, the university hosted a demonstration of



Figure 4. Norm Smith's wood chip furnace draws a crowd despite midday showers.

its experimental thinning studies on International Paper Company lands near Howland, Maine. The symposium proceedings will be published shortly, but at the meeting, guests received a copy of each address in "preprint" form. Very attractive typeset programs were also included in a UMO-produced meeting packet and envelope case. The professionalism of these packets made a striking impression, and we hope to have similar materials for the CANUSA International Research Symposium next fall.

Locally, CANUSA's technology transfer program at the Orono lab, coordinated by Robert Frank and UMO's Tim O'Keefe, entertained viewers with an innovative display. The Shelterwood Simulator (fig. 5) is a three-dimensional, hands-on model that involves the onlooker. At the left are flip panels on hardboard that tell the story of shelterwood thinnings to



Figure 5. Bob Frank's shelterwood simulator on display at the utilization conference.

increase the proportion of spruce and thereby lessen the chance for budworm damage. On the right is an ingenious rotating disk with wood tree shapes color keyed to the photos on the back of the display.

Viewers learn that the shelterwood system of silviculture is the best to use in spruce-fir stands that are vulnerable to budworm attack. The information comes from long-term research at the Penobscot Experimental Forest.

The simulator display is not small, but it is fully collapsible into its own suitcase for traveling. The display is available for showing; you may contact Bob Frank directly (FTS 833-7388 or 207-866-2080) to request shipment.

Special appreciation should be extended to Tom Corcoran of UMO, the general chairman of the conference, and to Dan Schmitt, program chairman. The meeting was very well run and encourages us to

expect equally profitable cooperation with UMO when we host our 1984 research symposium in Bangor.

Janet Searcy — Information Coordinator
CANUSA,
Washington, D.C.

Research Capsule: Genetic Variation in Apical Bud and Shoot Development in Balsam Fir

CANUSA-funded research examining the magnitude of genetic and developmental variation in bud and shoot development in balsam fir has been initiated at the University of Vermont in cooperation with the Northeastern Forest Experiment Station.



Figure 6. Photomicrograph of a fully developed balsam fir leader shoot apex collected in February of 1983.

At the end of a growing season, each balsam fir bud contains an embryonic shoot (fig. 6) enclosed by bud scales. These embryonic shoots have a dome at their apex (fig. 7), which initiates primordia at its



Figure 7. A balsam fir apical dome surrounded by the most recently initiated primordia.

base throughout the growing season, creating a miniature telescoped version of next year's shoot. In spring, the shoot elongates and most of the primordia develop into new needles. Simultaneously, a new bud containing an embryonic shoot is formed at the apex of this developing shoot.

Through periodic examination of developing embryonic shoots from trees representing a diversity of balsam fir seed sources or provenances, the degree and nature of variation in timing, rate, and duration of needle and bud scale initiation will be quantified. The timing of this developmental sequence, which is likely to vary among balsam fir provenances, could be critical to the successful foraging and development of spruce budworm and other insect predators. In effect, trees from some balsam fir seed sources may be less susceptible to spruce budworm attack and could, therefore, be favored over other seed sources in future reforestation.

Preliminary studies have demonstrated that provenance and whorl-within-tree account for most of the variation in total number of primordia initiated, whereas tree-within-provenance and bud-within-whorl account for relatively little variation. These studies have shown provenance variation in shoot length, needle number, and average distance between needles, with certain provenances consistently producing longer shoots with more needles.

Gary J. Hawley — USDA Forest Service
Burlington, Vermont

D. H. DeHayes — University of Vermont
Burlington, Vermont

JPU and JPPC Meet in Oregon

Meetings of the Joint Planning Unit (JPU) and the Joint Policy and Program Council (JPPC) took place this August at Timberline Lodge on the Mt. Hood National Forest and at the Forestry Sciences Lab in Corvallis. The JPU's travel arrangements included tours of budworm territory on the Ochoco National Forest as guests of Forest Service Region 6. Paul Buffam, director of Forest Pest Management in the Region, hosted that excursion.

The JPU convened Monday, August 8, at Timberline Lodge. Dan Schmitt and Ron Stark, Program Managers from the Eastern and Western U.S. components, attended the meeting to present highlights of the 1984 Plan of Work and Budget. Janet Searcy reviewed the status of CANUSA's USDA series publications, some of which have been delayed in the review and printing process. The JPU agreed to accept the Plan of Work and Budget for 1984 and recommended its approval by the JPPC as an action item.

Cochairman Murray Neilson reviewed the background for the next item of business: the CANUSA critique. (See the separate article on this topic elsewhere in this issue.) The JPU discussed the critique

team's recommendations in detail, voting to accept the seven suggestions with only minor adjustments. Also, the critique team's guidelines for future joint U.S.-Canadian programs were accepted with the proviso that the guidelines apply solely to a program designated as accelerated, not base funded, in both countries.

In an action item, the JPU accepted with thanks the report of the review team and agreed to forward the team's recommendations, with qualifications, to the JPPC.

On Tuesday, August 9, attention turned to the subject of transition planning by the U.S. element. Stark and Schmitt added their comments as printed in tables 1 and 2 of *Transition Plan Phase 3*, a document prepared to make recommendations to USDA



Figure 8 Another hard day in the office for JPU members (from left) Jay Hughes, Gerald Anderson, Murray Neilson, Les Carlson, and their R-6 host Paul Buffam. In the foreground is Ardella DeVan, who organized the box lunch under some very big pines in central Oregon.

Forest Service management to facilitate transition from accelerated to base-funded work.

Chuck Buckner presented the Canadian Forestry Service's recommendation that activity on the spruce budworms literature data base should continue. Paul Buffam endorsed the need for continued attention to R&D on budworm problems.

In an action item, the JPU advised the JPPC that the USDA Forest Service should continue the research elements identified in *Transition Plan Phase 3*, (tables 1 and 2) as unfinished. Forest Service units should be encouraged (1) to use this document as a source for planning, and (2) to continue contacts with user groups to refine its content. Linkages with Canadian Forestry Service establishments should be identified where appropriate.

At the 1982 JPU meeting, the Program Leaders were charged with proposing a framework for continuing joint efforts beyond CANUSA's termination date of September 30, 1984. This year's Plan of Work details the two frameworks that Mel and Chuck proposed. The JPU discussed, and ultimately supported, the proposal that could take the form of a

supplement to the existing Memorandum of Understanding on forestry research. The JPU felt that the objective should be to foster cooperation in research at the "doing" — program manager/scientist — level. No action item resulted from this discussion, however.

In its final session, on Wednesday, August 10, the JPU heard information reports on several topics. Dan Schmitt and Ron Stark reviewed the status of their eastern and western videotapes, which will be completed during the winter of 1983-84. Janet Searcy brought up two suggestions for continuing the *Newsletter* beyond CANUSA's end. The Northeastern Area of State and Private Forestry has offered to assume responsibility (as they have for the "Gypsy Moth-er"), quarterly publishing spruce budworm news on an international basis. And the Canadian Forestry Service, which presently handles typesetting, printing, and distribution, has offered to take over content responsibility as well, publishing at as-yet-unspecified intervals. Because formal offers of these services have not been received, the JPU made no decisions regarding the fate of the *Newsletter*, but this subject will certainly come up again before long.

Finally, Ron Stark reported on the status of plans for the international research symposium scheduled for September 17-21, 1984, in Bangor, Maine. All of those invited to present major synthesis papers accepted the responsibility. Commitments to participate in the workshops have not been secured from all invitees, however. Three learned societies — the Entomological Society of America, the Society of American Foresters, and the Canadian Institute of Forestry — agreed to provide scientific review of the symposium papers.

In preparing for adjournment, the JPU cochairmen thanked all those responsible for arrangements for the meeting, especially Paul Buffam for orchestrating the field trip to the Ochoco National Forest.

Thursday, August 11, marked the second annual meeting of the combined JPU/JPPC committees, which before 1982 met separately in July and August. Bob Buckman, Deputy Chief for Research, USDA Forest Service, convened the JPPC at the Forestry Sciences Laboratory in Corvallis, and JPU members stayed to listen. Paul Buffam extended his hospitality to include a group tour of the lab's facilities for producing Douglas-fir tussock moth virus. With that diversion to look forward to, the JPPC turned to business.

In discussing Program plans and budgets for 1984, Chuck Buckner expressed again the concern of CFS Program Managers that no action has resulted from the JPPC's 1982 recommendation that CFS allocate additional resources to hire a specialist in remote sensing. Carl Winget, JPPC cochairman, acknowledged the situation and cited difficulties in finding funds and appropriate expertise. He stated his belief that the position would be filled by year's end.

In the Activity Schedule, a new section — Activity J: Budworm Population Dynamics — has been established. Chris Sanders, the activity leader, is eager to have a U.S. counterpart identified for interface.

Chuck conveyed CFS's request that the *Spruce Budworms Bibliography* be continued beyond the Program's termination date. Recommendations, in order of preference, are (1) continued production by the USDA Forest Service, (2) joint production with the CFS, or (3) transfer of responsibilities for data collection and production to CFS. Jack Sullivan pointed out the wisdom of continuing the operation at least long enough to incorporate the many publications reporting CANUSA-sponsored work.

In its first action item the JPPC recommended that both the Deputy Chief for Research and the Director of Forest Insect and Disease Research, USDA Forest Service, provide a decision on support for the budworms bibliography project by January 1, 1984.

On the U.S. side, Mel McKnight reviewed the actions of the JPU/JPPC that led to development of technology transfer plans by CANUSA-East and -West and the Plan of Work and Budget for 1984. Dan Schmitt called particular attention to the need for post-CANUSA continuation on the American side of two important working groups: population control and population monitoring.

Publications management surfaced again as Janet covered the status of Program-sponsored books for the JPPC. Delay of Western U.S. books and the *Program Accomplishments Report* is of considerable concern because of commitments against FY 1984 (and 1985?) funds. In an action item, Janet was directed to draft a letter for the Deputy Chief of Research to the Director of the Office of Information, pointing out the accelerated status of CANUSA and requesting high priority for processing CANUSA-sponsored USDA series publications. The Canadian cochairman of the JPPC will assure that an appropriate message is received in the CFS publication system to effect similar expedited procedures.

In its final action item on these subjects, the JPPC accepted the 1984 plans and budgets as submitted and directed that they be forwarded to senior agency management for approval.

The Council next turned its attention to transition planning and reviewed the JPU's discussion on this subject. John Ohman urged that the transition plan be used to help the Forest Service find new assignments for CANUSA personnel. Mel pointed out that the appendix to *Transition Plan Phase 3* identifies basic opportunities in budworm/forest management research. Jean-Claude Mercier expressed interest in the Canadian Forestry Service's Implementation Plan, a parallel document serving the same purpose. Mercier stressed the importance of following up on promising research leads and cited the need for continued support of research on biological control methods.

The JPPC reaffirmed that spruce budworms R&D should continue in those areas identified as unfinished,

and that both the USDA-FS and CFS should ensure that land managers' and user groups' needs are considered and international linkages are identified where appropriate.

In the information reports section of the meeting, the U.S. Program Managers spoke briefly on their cooperative agreements with the University of Michigan to produce video tapes for use in technology transfer programs next year. Filming was completed late this summer with a few allegedly candid shots of the JPU and JPPC in action. Showings of the first version of the tapes are scheduled for mid-November.

Janet reported that *Newsletter* content is shrinking now that the Program is winding down on the U.S. side. Possibilities for producing the *Newsletter* after CANUSA ends were reiterated for the JPPC. In addition, Bob Buckman reported that Les Reed suggested that the *Newsletter* might be broadened after CANUSA to include other Canadian-U.S. cooperative forestry efforts besides budworm. Jack Sullivan felt that the matter of the *Newsletter* should be left to implementation of a post-CANUSA agreement and that our logo should not be used after the 1984 joint research symposium.

The action item from this discussion directs that the CANUSA *Newsletter* continue on its present bimonthly schedule, with acceptable variation in the number of pages, for the duration of the Program.

The Program Leaders reported that Issue No. 9 of the *R&D Management Inventory* was recently distributed. The tenth issue will be the last, and its content will be abbreviated by leaving out progress statements and publication citations. However, copies of the entire computer file will be deposited in agency libraries.

Friday morning's discussion centered on the critique of CANUSA administration and organization, which is covered in detail elsewhere in this issue. The JPPC accepted the JPU's critique and instructed the Program's Information Coordinator to prepare the synopsis mentioned above. The JPPC deferred making a decision on evaluating overall Program effectiveness until a later date.

As their final charge, the JPPC took up the issue of post-CANUSA coordination of U.S./Canadian programs. The JPU had endorsed a proposal from the Program Leaders to supplement the Memorandum of Understanding to continue across-the-border cooperation among project leaders and scientists working on budworm problems. However, no action item resulted from the JPU's discussion. The JPPC decided that the objective of this proposal needs to be strengthened to emphasize coordination of research. Also, the agreement will be restricted to research and not touch on operational (i.e., control) programs, and it will be broadened to deal with western spruce budworms in Canada and the United States.



Figure 9. On the way from Bend to Corvallis, the JPU/JPPC caravan stopped for a break at a scenic overlook on the Willamette National Forest. Chuck Buckner and Ardella model the CANUSA can-of-worms T-shirt, which is still available from Bob Talerico (FTS 489-3015, or (215) 461-3015). Note the Oregon mist in the background.

In its last action item, the JPPC instructed the Deputy Chief for Research on the U.S. side to direct the heads of International Forestry and Forest Insect and Disease Research to develop a post-CANUSA supplement to the existing Memorandum of Understanding for cooperation in forestry research, based on the Program Leaders' proposal as modified by discussion.

There was some talk in both the JPU and JPPC meetings about the possibility of each or both bodies dissolving now that CANUSA is in its final year. The JPPC concluded, though, that both groups should remain in place until the joint research symposium in Bangor. Both committees will convene there, rather than in August of '84, to deal with matters concerning future programs.

JPPC cochairmen Buckman and Winget expressed the gratitude of all attendees for the hospitality of the Oregonians, especially Paul Buffam for his field trips, Paul and LeRoy Kline for their summary of the budworm situation in the West, and Martha Brookes for her home-catered lunch on the day of departure. CANUSA-West investigators Jimmie Colbert, Kathy Sheehan, Nick Crookston, Tom Bible, and Bob Campbell were thanked for their special presentation of local work on modelling.

Bob Buckman presented Certificates of Merit to four USDA Forest Service employees for their work during the Program. Ron Stark and Dan Schmitt were cited for managerial excellence, Janet Searcy for coordination of Departmental series publications, and Ardella DeVan for her work as Program secretary in the Washington Office.

Program Critique

During the past year, a review team has been interviewing CANUSA Program Management and other people connected with the Program to evaluate the



Figure 10. In front of the Corvallis lab's imposing carved door stand this year's attendees at the JPU/JPPC meeting. From the left, Jack Sullivan, Russ Mitchell, Denver Burns, Jean-Claude Mercier, Paul Buffam, George Green, Chuck Buckner, Bob Buckman, Murray Neilson, Ardella DeVan, Carl Winget, Ross Macdonald, Ron Stark, Janet Searcy, Fred Knight, Gerard Paquet, Gerald Anderson, John Ohman, Jim Stewart, Mel McKnight, Dan Schmitt, and Jay Hughes.

effectiveness of our organization and administration. Team members Ken Runyon and Dennis Lachance (Canadian Forestry Service), Jack Coster (West Virginia University), and leader Ken Knauer (USDA Forest Service) turned in their report early this summer. (For a summary of the beginnings of this review project, see *Newsletter* No. 25, November 1982, in the article "JPU and JPPC Meet Together in the Soo.")

The report was studied in detail at this year's Joint Planning Unit (JPU) meeting and passed along, with modifications, to the JPPC. This article summarizes the report and the JPU's recommendations.

For the benefit of *Newsletter* readers unfamiliar with our organization, here is a brief outline of CANUSA's structure. The Program is guided by two committees. The JPU provides staff support for direction handed down by the Joint Policy and Program Council (JPPC). Responsibility for overseeing the accomplishment of the JPPC's directives falls on the Canadian and U.S. Program Leaders (Chuck Buckner and Mel McKnight) and on Program Management at Portland, Oreg., Broomall, Pa., and several venues in Canada. The previous "big bug" programs on the U.S. side had a single program board to which the Program Managers reported. CANUSA's Program Leaders report up the line to management but do not direct day-to-day operations in the field.

The review team was charged with evaluating CANUSA's management structure — not its accomplishments or the success of individual personnel within that structure. (These subjects will eventually be addressed in a second critique of the Program as a whole, probably after 1985.) The review team conducted on-site and telephone interviews to obtain cooperator, client, and user impressions of CANUSA. In all, 138 administrators, research managers, investigators, and users in both countries were interviewed. The team operated in pairs — one from each country — and all interviewees answered the same set of questions.

In their report, the review team cited several Program accomplishments worthy of specific recognition. Foremost were the improved communication and personal rapport among the executive administrators of the Canadian Forestry Service (CFS) and USDA Forest Service (USDA-FS).

In both countries the existence of CANUSA demonstrated to State/Provincial authorities that both Federal Governments were serious about improving technology for controlling the budworms. CANUSA provided the impetus for the Canadian Task Force Review and the follow-up Spruce Budworm Implementation Plan that became the national plan for budworm research in Canada. The Review and Implementation Plan fostered a more cohesive working relationship among the Forest Research Centres. The critique team also cited interviewees' favorable comments on the spruce budworms literature project and

the Program's emphasis on cooperative field trials and demonstration projects that helped foster standardization of evaluation techniques in both countries. The reviewers believe that CANUSA succeeded in raising the overall level of expertise on the spruce budworms.

But the review team concentrated on another issue: Was the Program organized to maximize its primary goal? The Memorandum of Understanding states this goal is "to design and evaluate management strategies for control of the spruce budworms and/or management of budworm-susceptible forests which will assist forest managers to attain management objectives in an economically and environmentally acceptable manner." Responding to the reviewers' queries, interviewees expressed greatest concern about three organization elements: the JPU/JPPC, the Program Leader positions, and Working Groups.

- *Finding:* The need for both the JPU and JPPC was poorly understood by most people questioned. The impression that the JPPC did not have an operational role and that the JPU was only infrequently involved in managing CANUSA gave rise to a broad sentiment that one or both of these bodies were not needed. On the Canadian side, some interviewees felt that money spent to convene the annual meetings of these committees could better be used to send CANUSA investigators to Program planning and common interest meetings. The review team concluded that the disenchantment of many Canadian investigators toward CANUSA had its roots in misapprehension of the roles and duties of the JPU and JPPC. The reviewers did note, however, that the committee members have come to perceive their own functions more clearly in recent years, and also to work in a productive and complementary fashion.
- *Finding:* The Program Leaders' lack of proper authority reduced their effectiveness. Mel and Chuck occupy staff positions in which both report up the line within their organizations but neither has direct authority over day-to-day Program management, which is handled in the United States at Portland and Broomall, and in Canada at the seven Forest Research Centres and Institutes in several Provinces.

The 1977 Memorandum of Understanding between Environment Canada and the USDA established six functions for the Program Leaders, but most interviewees and the review team itself saw the role of these people as primarily that of information coordinators, not supervisors of management. The JPPC apparently saw the Program Leaders in another light. Minutes of JPPC meetings are shot through with instructions to Chuck and Mel that imply that the JPPC believes the Leaders have the authority to direct CANUSA activities.

The review team believes that the Program Leaders were seriously compromised in their ability to provide direction to their respective programs through this lack of authority. The lack of East/West coordination of research and delays in implementing Program-wide standards for data collection and experimental design were attributed in part to the fact that Experiment Station Directors in the United States and Program Managers in Canada were not accountable to CANUSA's Program Leaders. The review team felt that Mel and Chuck were given wide-ranging tasks to accomplish but were left with only their powers of persuasion, and not line authority, to facilitate such tasks.

- *Finding:* Working groups were not effectively used in Program planning and implementation. In both the East and West, CANUSA has working groups — formal groups organized around specific themes (silviculture, biological control, etc.). Their purpose is to advise Program Management on (1) user and research needs, and (2) resource allocation recommendations for base-funded and Program-funded R&D activities. Interviewees expressed considerable dissatisfaction and confusion about the purpose of these working groups. Canadians in the East were particularly disillusioned with the theme-oriented groups and eventually declined to participate. Many interviewees felt that the working-group meetings failed to keep them abreast of the status of spruce budworm research. But members of the groups with well-defined objectives, such as the B.t. groups and pheromone group, felt positive about their experiences.

Administration Items

After all interviews were completed, the review team identified four administration items that they felt represented opportunities for fashioning a more effective joint program.

- *Finding:* The planning process did not sufficiently recognize differences between the two countries in administrative procedures and research needs. Canadians perceived the Activity Schedule as essentially a U.S. plan, to guide American budworm research. Budget constraints north of the border meant that work done under the CANUSA umbrella was mainly "business as usual." No extra funding was available in Canada, and no real opportunity for program expansion was sought.

The Canadians had no experience with the convergence analysis planning technique used in planning the Program and therefore felt alienated from the planning process. Some users on the U.S. side registered the same complaint. The review team felt that convergence analysis may have created unrealistic

expectations for both scientists and users — expectations that if unfulfilled, could prove damaging to their overall assessment of CANUSA in the ultimate evaluation exercise.

- *Finding:* Differences between the United States and Canada in the level of funding for CANUSA affected the extent to which a joint program was achieved. Before CANUSA, CFS was deeply involved in ongoing, base-funded budworm research; the USDA-FS had a limited base-funded program. When accelerated program funds became available in the United States, budworm research took off. No such opportunities were available in Canada, where CANUSA generated no new financial support and was perceived by many Canadian researchers as siphoning away support from their long-term efforts in budworm R&D.

The lack of accelerated funding in Canada also meant that university investigators there could not compete for research grants except through CANUSA-U.S. The prospect of U.S. control and reporting requirements was sufficiently chilling that only a few Canadian university scientists negotiated agreements to perform CANUSA research. Lurking behind the scenes was the conviction that promising work might have to be dropped abruptly once CANUSA funding expired, and the feeling that base funds were eroding away because accelerated funds had become available in the United States.

- *Finding:* Unresolved differences in research philosophy and Program expectations between Canada and the United States encumbered the implementation of CANUSA. Primary areas of conflict were scope of the Program, selection of priorities, differences in the state of knowledge, and a lack of agreement about what was expected from CANUSA. American investigators registered satisfaction with the Program's Activity Schedule while Canadians felt it did not address gaps in past research that needed filling. The Canadians and users expected CANUSA to concentrate on developing tools for users that could become available within the Program's 5-year time frame. American investigators expected CANUSA to accelerate the formulation of a budworm management strategy that would incorporate new and existing tools.

The review team concluded that the international divergence in philosophy and Program expectations has three significant implications: (1) Canadian investigators were generally noncommittal about the Program. (2) Users in both countries were skeptical about the benefits of a program they believed catered to research interests. And finally, (3) the failure to recognize that serious differences existed between the two countries prolonged difficulties in communication and prevented some of the cooperation that CANUSA intended to facilitate.

- *Finding:* Information exchange was generally adequate for the needs of scientists and administrators but inadequate for the needs of users. CANUSA's increased interest in information management (compared to previous accelerated R&D programs) is reflected in the existence of many documents: the *R&D Management Inventory*, the *Spruce Budworms Bibliography*, the *CANUSA Newsletter*, and several internal publications such as the Western U.S. Manager's Memo and the Eastern U.S. "Dear Colleague" letter. Research administrators directly involved in the Program also received the annual Plan of Work and Budget.

Interviewees agreed that a major benefit of the Program was increased scientist-to-scientist communication. But users felt many Program outputs were directed at other audiences. One complaint was that recent issues of the *Newsletter* had displaced useful information about research and reports of the status of projects with stories about the comings and goings of Program personnel.

The review team reaffirmed that user-oriented publications are important in obtaining practitioner support and input for research planning, and in promoting earlier application of research findings.

Recommendations to the JPU

The review team concluded that seven major recommendations deserve special attention by those charged with setting up future joint R&D programs.

1. A two-tier committee system to run the Program is impractical. Specifically regarding CANUSA, the JPPC and JPU should be combined to form an Executive Planning Council. This body should obtain its technical advice on subject matter issues from a committee of experts.
2. A joint program should have a Program Leader from each side with authority commensurate with the accountability of the position. The Leaders should be experienced managers and recognized experts in the problem being addressed.
3. Working groups are essential for gaining cooperator and user support and should be formed early in the program planning process. A group should be established for every target area being addressed by the Program. These groups provide the detailed planning, monitor progress, and evaluate results.
4. Structure the planning process to involve those who will study, develop, and use the technology. Begin with a panel of experts to identify broad needs and opportunity areas, and form working groups for each area. Keep the Program narrowly focused on problems solvable within the Program's life.
5. Require each partner to provide "new money," beyond base funding, for an accelerated effort.
6. Focus on applied research that can be handled in

the time-limited format of an accelerated Program.

7. Emphasize user-oriented publications and modify usual publication procedures to speed up processing and distribution. Involve users as coauthors of such publications and as partners in other technology transfer efforts.

The JPU Responds

Several hours of discussion at the JPU meeting centered on analyzing the review team's report and making recommendations to the JPPC regarding its content. Overall, the JPU accepted the seven recommendations proposed above but suggested some modifications. First, the JPU felt that recommendations pertain solely to future joint *accelerated* programs. Responding to recommendation no. 1, the JPU concluded that two committees are still necessary and appropriate for directing the Program — one with responsibility to develop it and the second to approve the Program. The majority of JPU and JPPC members believe that some other arrangement for management is desirable, though there was no consensus as to what direction should be taken by future joint programs. Recommendation no. 2 was accepted except for the requirement that Program Leaders must be experts in the subject problems. The JPU emphasized that management ability is at least as important as knowledge of the problem to be investigated.

On the working group issue (recommendation no. 3), the JPU agreed with the review team provided that the number of groups remain flexible during the life of the Program, with the proviso that the technology transfer group is essential and a constant.

Speaking through the JPU, CANUSA extended its thanks once again to Ken Knauer, Ken Runyon, Dennis Lachance, and Jack Coster for the many hours they put in on the review. The JPPC accepted the JPU's critique, but deferred making a decision on evaluating overall Program effectiveness until a later date.

Ent. Soc. of Canada Meeting

The Entomological Society of Canada announces its annual meeting for 1984 will be held jointly with the Acadian Entomological Society at the Algonquin Hotel, St. Andrews, New Brunswick, September 30 to October 4, 1984. The theme of the meeting will be "Resources." The program includes symposia on the following: entomological perspective on resource management, resource modelling, biological control, chemical control, population dynamics, and Welland insects. Also included are short courses on modelling and computers and spray technology, and poster displays and field trips. It is expected that spruce budworm research will be featured in several symposia. The meeting follows on the heels of the CANUSA Conference at Bangor, September 19–22, 1984, and some CANUSA members might want to link the two meetings.

Population Dynamics Studies at GLFRC

As part of a long term program begun in 1982 at the Great Lakes Forest Research Centre (GLFRC) to determine the population dynamics of spruce budworm, intensive sampling was carried out in two contrasting populations in 1983, one of increasing density (Black Sturgeon Lake), the other decreasing (Gargantua region near Sault Ste. Marie, Ont.). Samples were taken twice each week from May to August, the insects counted, and then reared by Forest Pest Management Institute (FPMI) staff to determine causes of mortality. The data will take several months to analyze, but early indications are that although parasitism is high in both areas, the BSL population has less disease than Gargantua, resulting in a higher survival rate. Associated experiments showed that although many larvae fall to the ground at high population densities, nearly all are killed by predators.

“PRUF” — What is it?

As part of The Forestry Sector Strategy Paper for Canada, which has been approved by the Federal cabinet, the Human Resources sector includes a 3-year Program of Research by Universities in Forestry (PRUF) to encourage forestry research among the university community in Canada. This program is intended to supply funds for research at any degree-granting university in Canada. The 3-year period started in the 1983–84 fiscal year and continues through the 1985–86 fiscal year. After this period the CFS will evaluate the impact of the research generated in the program on both the universities and the forest industry. If the program demonstrates merit, a request to Treasury Board will be made for a continuing commitment. Any university or faculty may apply for grants, as long as the research involves one of the various disciplines of forestry, such as forest protection, entomology, forest management, and so forth. For information contact the Director of the nearest CFS regional research centre or institute, or submit enquiries to the Forestry Subvention Program, CFS, Ottawa, Ont. K1A 1G5.

New Joint Agreement Signed

A Canada-United States agreement, similar to the CANUSA Spruce Budworms Program, has been negotiated between the USDA Forest Service and the Canadian Forestry Service. The new project is intended to provide a 5-year cooperative research plan to develop common technology for wood light-frame structures. Contacts for the new agreement are Bill Bohannon, Assistant Director of the USDA Forest Service Forest Products Laboratory, Madison, Wisconsin, and Vishwa Mathur, Scientific Advisor Forest Products, CFS, Ottawa.

Environment Canada Gets A New Minister

Charles L. Caccia has replaced John Roberts as Minister for the Environment in a recent Federal Cabinet shuffle. Mr. Caccia graduated in the economics of forestry from the University of Vienna in 1954. In 1955 he joined the Faculty of Forestry of the University of Toronto as a trade analyst until 1959 when he formed his own consulting and publishing firm. In 1968 he was elected to the House of Commons as Liberal M.P. for Davenport, Toronto, a constituency which he has represented from that time. The Canadian Forestry Service looks forward to working with Mr. Caccia because of his expertise and credentials in forestry.



Figure 11. Charles L. Caccia, newly appointed Minister for the Environment.

Errol Caldwell Joins FPMI

Errol T. Caldwell has recently been appointed to the position of Program Manager – Chemical Control Agents at the Forest Pest Management Institute. Errol assumed his duties September 6, 1983, taking up the position vacated by Jack Armstrong, who was transferred to CFS Headquarters in Ottawa this spring.

Many of you know Errol through his activities in the Evaluation Section, Pesticides Division, Agriculture Canada, which he left to join us. While with the Pesticides Division, he was an Insecticide Evaluation Officer for approximately four and one-half years, evaluating scientific and technical information on insecticides and establishing standards and condi-



Figure 12. Errol T. Caldwell, Program Manager – Chemical Control Agents at FPMI.

tions under which these products are registered and regulated in Canada under authority of the Pest Control Products Act. All forestry use insecticides were under his purview during this period. He assisted in coordinating Canada/United States registrations in the CANUSA Program as well.

Errol obtained his undergraduate degree (zoology) at the University of Toronto and his MSc (entomology) at the University of Guelph. He brings with him to his new position a great deal of experience in pesticide registration, regulation, and use which will be extremely beneficial to us all.

Items from the Press

Spruce budworm infestation grows in Shasta-Trinity Forest. — For the first time in California, the western spruce budworm — one of the insect scourges of commercial and recreational timberlands — has started to eat a swath through the Shasta-Trinity National Forest.

Royal Mannion, national forest spokesman in Redding, said 90,000 acres in Trinity and Shasta Counties may be infested.

Biologists last summer surveyed empty egg casings of the insect left by its larvae, which do the most damage to trees. Officials believe the area has more than doubled this year.

(Sacramento Bee — August 26, 1983)
Sacramento, California

Spruce budworm project completed. — Aerial spraying of a western spruce budworm infestation in the Blue Mountains of eastern Oregon was completed by mid-July. Spraying began June 12.

The cooperative effort of Oregon State Department of Forestry and the Forest Service resulted in spraying 524,561 acres of Douglas-fir and white fir timber. The area sprayed is equal to a mile-wide strip extending 819 miles.

Sevin-4-Oil was the insecticide used on 96 percent of the area. Two percent was treated with *Bacillus thuringiensis* and the remainder with Zectran. About 262,000 gallons of Sevin-4-Oil was used. Total cost of the project came to approximately \$4,800,000.

(The Greensheet — August 19, 1983)
USDA Forest Service Region 6
Portland, Oregon

Resources ministry to trim researchers. — Ontario will pare as many as 200 highly qualified scientists from its natural resources staff to shrink the size of government in the province and streamline its research capacity.

"With increasing demands to reduce the size of government it is becoming increasingly difficult to isolate research from the pressures to seek new ways of delivery of government programs," says an internal departmental statement by W. T. Foster, Deputy Minister of Natural Resources.

"I do not see the generation of scientific knowledge by the ministry as a legitimate role in the present circumstances."

The ministry had assumed a major research role in the areas of wildlife, fisheries and forestry because the private sector had either not had the money or the willingness to conduct world class scientific work.

Scientists at the Ministry of Natural Resources learned this week that the ministry wants to divest itself of its research capacity during the next three years and start buying its research from Ontario universities on a contract basis.

(Globe & Mail — July 23, 1983)
Toronto, Ontario

Spray program needed. — Cumberland County woodlot owners are afraid the spruce budworm will destroy their entire forests unless an improved and less expensive spray program can be developed.

Three Cumberland County woodlot owners — Max Spicer of Spencer's Island; Harry McLellan of Economy; and Charlie Harrison of Halfway River made the comments after a tour of budworm-devastated woodlands in the county.

The tour, arranged by the Nova Scotia Forest Products Association was designed to give Nova Scotian woodlot owners an opportunity to see "very bad" budworm damage in Cumberland County, Lorne Etter, the associations' executive director, said.

(Chronicle-Herald — June 13, 1983)
Halifax, Nova Scotia

The pheromone cage. — For the past two years, the Laurentian Forest Research Centre has been developing a new detection tool — the pheromone cage.

Pheromones are highly developed hormones that are used by insects for communication. These chemical substances indicate their routes, their gatherings, and various dangers.

The pheromone cages used by the LFRC attract male moths of specific insects by means of a female sex hormone produced chemically in a laboratory. By counting the trapped moths, researchers can forecast, to a certain extent, what numbers of the insect will be present the following year.

A network of 400 traps has been set up in Quebec to attract spruce budworm moths. These traps are of American design, but the researcher in charge of pheromone research at the LFRC, Luc Jobin, is working on making a Canadian prototype.

Mr. Jobin is also doing several experiments to determine the ideal conditions for installation of the traps.

(La Presse — August 24, 1983)
Montreal, Quebec
(Translated from French)

Recent Publications

Quick Quiz: What spruce budworm publication is no. 5 on the Pacific Southwest Forest and Range Experiment Station's list of the ten most requested pubs since October 1982? It's Research Paper PSW-159, "Computer simulation for integrated pest management of spruce budworms," by Carroll B. Williams, Jr., and Patrick J. Shea. Request your copy from the Station at 1960 Addison Street, Box 245, Berkeley, CA 94701.

Forest-Gram South, a newsletter from the Southern Region of the USDA Forest Service, calls attention to two recent articles on computers in forestry. "Use of personal computers in forest farming," published in the 1983 *Forest Farmer Manual Edition*, discusses the basic criteria to consider in selecting a computer. This article is an easy-to-understand introduction to low-cost systems being used to process forestry data. Software and applications are discussed, as well as computer operation, cost, and selection. Applications for microcomputers fall primarily into three categories: financial and investment analysis, growth and yield, and inventory and measurements. Recently developed programs are available for pest-management decisionmaking and for evaluating cable logging systems. "Microcomputers: their potential for foresters," published in the June 1983 issue of the *Journal of Forestry*, discusses the results of a 1982 Purdue University conference. The article briefly reviews application programs presented at the meeting. For reprints of either article, write to the USDA Forest Service, Information Center, 1720 Peachtree Road, NW, Suite 816, Atlanta, GA 30367.

The following publications from recent CANUSA Symposia are available from the authors.

W. Lloyd Sippell, Great Lakes Forest Research Centre, Box 490, Sault Ste. Marie, Ont. P6A 5M7. "Planning now to reduce, postpone, or prevent the next spruce budworm outbreak."

Ralph C. Keef, Nova Scotia Forest Industries, Port Hawkesbury, Nova Scotia. "Utilization of budworm-killed spruce and fir in full scale sulfite processing."

Windsor Kelly, Nova Scotia Forest Industries, Port Hawkesbury, Nova Scotia. "The salvage and storage of pulpwood from dead and dying spruce and fir — problems and results of a 4-year program."

Frank E. Webb, Forest Protection Limited, P.O. Box 1030, Fredericton, N.B. E3B 5C3. "New and improved techniques for monitoring and evaluating spruce budworms."

Other publications available:

"The spruce budworm problem in Ontario — real or imaginary?" Proceedings of a symposium sponsored by the Ontario Ministry of Natural Resources and the Great Lakes Forest Research Centre. For a copy, write to GLFRC, Box 490, Sault Ste. Marie, Ont. P6A 5M7.

From the Province of British Columbia, Ministry of Forests, Victoria, B.C. V8W 3E7, you may request

R. F. DeBoo and W. J. G. Beveridge. 1983. "A mobile weather measurement system." Pest Management Report No. 2.

The USDA Forest Service, Missoula, MT 59806 can supply

David G. Fellin and Jerald E. Dewey. 1983. "The western spruce budworm." For. Insect Dis. Leaflet 53.

Three articles on budworms also appear in the spring issue (Vol. 9, No. 1) of *Western Woodlands*, a natural resource journal:

David G. Fellin, Raymond C. Shearer, and Clinton E. Carlson. "Western spruce budworms in the northern Rocky Mountains."

David G. Fellin. "Chemical insecticides vs the western spruce budworm: After three decades, what's the score!"

Wyman C. Schmidt, David G. Fellin, and Clinton E. Carlson. "Alternatives to chemical insecticides in budworm-susceptible forests."

To get more information or to have your name added to the mailing list for the *Newsletter*, contact:

Canada-United States Spruce Budworms Program
USDA Forest Service
P.O. Box 2417, RPE-605
Washington, DC 20013

Canada-United States Spruce Budworms Program
Canadian Forestry Service
19th Floor, Place Vincent Massey
Ottawa, Ont. K1A 1G5